July 16, 2014

Joseph Laydon
Grafton Town Planner
Grafton Memorial Municipal Center
30 Providence Road
Grafton, MA 01519

Dear Mr. Laydon,

SunEdison, LLC has entered into contract with Tufts University to develop two solar photovoltaic (PV) facilities at the Cummings School of Veterinary Medicine at Tufts University campus in North Grafton. . This letter serves to summarize the purpose of the electricity to be generated, as well as the historic consumption of electricity at the Tufts Grafton campus.

Knoll Site

The Knoll Site PV facility will directly offset the consumption of electricity from the distribution grid at the Tufts-owned Grafton campus transformer. Each kilowatt-hour (kWh) of electricity generated by the Knoll Site PV facility will reduce the amount of electricity that Tufts' purchases from the utility company by one kWh.

From July 2013 through June 2014, the total kWh of electricity consumed at the Cummings School was 10.940 million kWh.[1] The Knoll site PV facility is projected to generate 3.373 million kilowatt-hours (kWh) of electricity in the first year of operation. That is, approximately 30% of the building's annual electricity use will be offset with less expensive solar electricity from the Knoll Site PV facility.

Science Park Site

While the Knoll Site project will directly offset electricity use at the Cummings School on a kWh-for-kWh basis, the Science Park PV facility will generate net metering credits to further reduce electricity costs at Cummings. The Science Park facility is a virtual net metering facility – it is interconnected to the electric grid in a manner that allows electricity generation at the Science

[1] FY2014 Tufts Grafton electricity consumption information from National Grid was provided by Tufts University.

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Park site to offset electricity costs elsewhere on the campus. Electricity generated by this facility will be delivered directly to the grid, and the utility company will compensate Tufts for the value of this electricity at near-retail rate. This compensation will be provided in the form of net metering credits, which the utility company will apply to the Cummings School's electricity bill, further reducing Tufts' electricity costs at the Grafton campus. This interconnection approach maximizes the value of the solar PV facility to Tufts.

The Science Park project will generate approximately 1.592 million kWh of electricity in the first year. At the current National Grid net metering credit rate of $0.162 per kWh, the estimated total value of net metering credits to be applied to the Tufts' Veterinary School building electric bill is $258,000 in the first year.

Net Impact on Tufts' Electricity Use

Together, the Science Park and Knoll site PV facilities will not produce more electricity than can be used by the Veterinary School building, as seen below.

	FY2014 Consumption (kWh)	Anticipated Annual Generation (kWh)
Campus Service #1 (Veterinary School Building)	10,939,600 kWh	N/A
Campus Service #2	763,000 kWh	N/A
Knoll Site PV Facility	N/A	3,373,000 kWh
Science Park Site PV Facility	N/A	1,592,000 kWh
Subtotal	(a)11,702,600kWh	(b) 4,965,000 kWh
Net Impact (a)-(b)	**6,737,600 kWh**	-

Accessory Use

SunEdison would like to certify that total annual electricity production from the two planned PV facilities will not exceed the Cummings School's Grafton campus total annual electricity consumption. Consequently, the projects are not commercial generation facilities. SunEdison will be installing the PV systems exclusively for the purpose of generating power for the use of Tufts University. It is our position that these solar facilities constitute an accessory use. For permitting

with the Grafton Planning Board, we wish to proceed with the project plan review process as outlined in Section 9 of the Grafton Zoning By-law.

For reference, we have attached the following supporting documentation:

- PVSyst report, Knoll Site PV Facility
- PVSyst report, Science Park Site PV Facility

We look forward to your consideration of our position, and we are available to provide additional information and address questions, as needed.

Sincerely,

Grace S Tangirala
Project Engineer D&E

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Cc: E. Isenstein, Tufts

J. Poteete, Tufts

Grid-Connected System: Simulation parameters

Project : **Tufts**

Geographical Site	**Worchester Regional Arpt**			Country	**United States**
Situation		Latitude	42.3°N	Longitude	71.9°W
Time defined as		Legal Time	Time zone UT-5	Altitude	300 m
		Albedo	0.20		
Meteo data:	**Worchester Regional Arpt**	TMY - NREL: TMY3 hourly DB (1991-2005)			

Simulation variant : **8 foot 20 degree True South**

Simulation date 18/07/14 12h04

Simulation parameters

Collector Plane Orientation		Tilt	20°	Azimuth	0°
43 Sheds		Pitch	6.20 m	Collector width	4.00 m
Inactive band		Top	0.02 m	Bottom	0.02 m
Shading limit angle		Gamma	29.58 °	Occupation Ratio	64.5 %
Models used		Transposition	Perez	Diffuse	Measured
Horizon		Free Horizon			
Near Shadings	Mutual shadings of sheds				

PV Array Characteristics

PV module	Si-mono	Model	**MEMC-M320BYC-3Z**		
		Manufacturer	MEMC		
Number of PV modules		In series	11 modules	In parallel	740 strings
Total number of PV modules		Nb. modules	8140	Unit Nom. Power	320 Wp
Array global power		Nominal (STC)	**2605 kWp**	At operating cond.	2637 kWp (25°C)
Array operating characteristics (50°C)		U mpp	415 V	I mpp	6349 A
Total area		Module area	**15924 m²**	Cell area	14265 m²
Inverter		Model	**AE 500TX-480**		
		Manufacturer	Advanced Energy Industries, Inc. (AE)		
Characteristics		Operating Voltage	310-595 V	Unit Nom. Power	500 kW AC
Inverter pack		Number of Inverter	4 units	Total Power	2000 kW AC

PV Array loss factors

Array Soiling Losses

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
7.5%	6.0%	2.5%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	2.0%	5.5%

Thermal Loss factor		Uc (const)	25.0 W/m²K	Uv (wind)	1.2 W/m²K / m/s
Wiring Ohmic Loss		Global array res.	0.97 mOhm	Loss Fraction	1.5 % at STC
LID - Light Induced Degradation				Loss Fraction	2.0 %
Module Quality Loss				Loss Fraction	-0.4 %
Module Mismatch Losses				Loss Fraction	0.5 % at MPP
Incidence effect, ASHRAE parametrization		IAM =	1 - bo (1/cos i - 1)	bo Param.	0.04

Grid-Connected System: Simulation parameters (continued)

System loss factors

AC wire loss inverter to transfo	Inverter voltage	475 Vac tri		
	Wires	50 m 3x2500 mm²	Loss Fraction	0.5 % at STC
External transformer	Iron loss (24H connexion)	5158 W	Loss Fraction	0.2 % at STC
	Resistive/Inductive losses	0.8 mOhm	Loss Fraction	0.9 % at STC
Unavailability of the system	3.6 days, 3 periods		Time fraction	1.0 %

User's needs : Unlimited load (grid)

Grid-Connected System: Main results

Project : **Tufts**

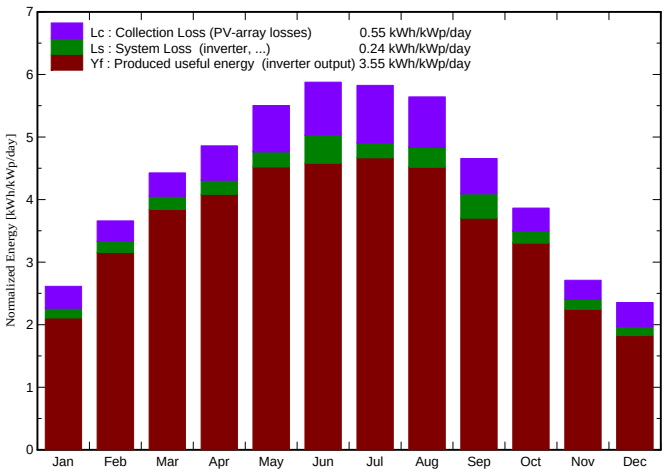
Simulation variant : **8 foot 20 degree True South**

Main system parameters		System type	**Grid-Connected**		
PV Field Orientation		Sheds disposition, tilt	20°	azimuth	0°
PV modules		Model	MEMC-M320BYC-3Z	Pnom	320 Wp
PV Array		Nb. of modules	8140	Pnom total	**2605 kWp**
Inverter		Model	AE 500TX-480	Pnom	500 kW ac
Inverter pack		Nb. of units	4.0	Pnom total	**2000 kW ac**
User's needs		Unlimited load (grid)			

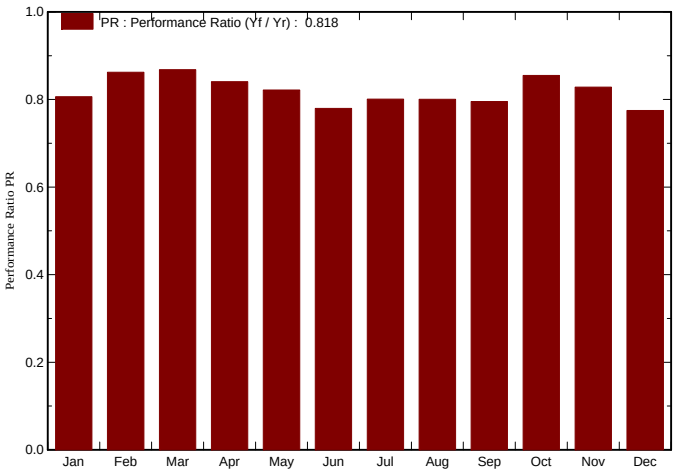
Main simulation results

System Production	**Produced Energy**	**3373 MWh/year**	Specific prod.	1295 kWh/kWp/year
	Performance Ratio PR	81.8 %		

Normalized productions (per installed kWp): Nominal power 2605 kWp



Performance Ratio PR



8 foot 20 degree True South

Balances and main results

	GlobHor kWh/m²	T Amb °C	GlobInc kWh/m²	GlobEff kWh/m²	EArray MWh	E_Grid MWh	EffArrR %	EffSysR %
January	58.1	-6.80	81.0	66.7	182.7	170.2	14.16	13.19
February	79.8	-3.78	102.4	90.2	243.3	230.1	14.91	14.10
March	115.2	0.28	137.2	127.5	327.2	310.3	14.98	14.20
April	134.7	6.51	145.8	137.3	336.7	319.2	14.51	13.75
May	166.5	14.24	170.6	160.4	384.4	365.1	14.15	13.44
June	176.1	17.70	176.3	165.5	393.1	358.0	14.00	12.75
July	178.5	21.37	180.6	169.4	396.1	376.8	13.77	13.10
August	163.2	18.86	174.9	165.0	390.3	364.6	14.02	13.09
September	122.0	15.16	139.7	131.4	319.8	289.4	14.38	13.01
October	93.4	9.82	119.8	112.6	282.2	266.8	14.79	13.99
November	57.6	3.70	81.3	72.5	187.8	175.4	14.51	13.55
December	49.6	-1.72	73.0	59.4	159.0	147.4	13.67	12.68
Year	1394.7	8.01	1582.7	1457.9	3602.8	3373.4	14.30	13.39

Legends:

GlobHor	Horizontal global irradiation	EArray	Effective energy at the output of the array
T Amb	Ambient Temperature	E_Grid	Energy injected into grid
GlobInc	Global incident in coll. plane	EffArrR	Effic. Eout array / rough area
GlobEff	Effective Global, corr. for IAM and shadings	EffSysR	Effic. Eout system / rough area

Grid-Connected System: Loss diagram

Project : **Tufts**

Simulation variant : **8 foot 20 degree True South**

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Loss diagram over the whole year